## **CLAIMS:**

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- 1. An article made of a magnesium alloy tube, the article having a grain size of between  $10\mu m$  and  $50\mu m$  and being manufactured by internal high pressure forming.
- 5 2. An article according to Claim 1, wherein the temperature of the internal high pressure forming is between 200°C and 605°C.
  - 3. An article according to Claim 1, wherein the tube was manufactured by extrusion.
- 4. An article according to Claim 3, wherein the extrusion temperature is between 300°C and 605°C.
  - 5. An article according to Claim 3, wherein the extrusion speed is substantially between 5 mm/sec and 45 mm/sec.
  - 6. An article according to Claim 3, wherein the extrusion reduction ratio is substantially between 10:1 and 50:1.
- 7. An article according to Claim 3, wherein the extrusion temperature is between 300°C and 605°C, the extrusion speed is substantially between 5 mm/sec and 45 mm/sec, and the extrusion reduction ratio is substantially between 10:1 and 50:1.
- 8. An article according to any one of the above claims, wherein the magnesium alloy is selected from the group consisting of AZ31 and ZM21.
  - 9. An article according to Claim 8, wherein the extrusion reduction ratio is substantially 30:1, the extrusion speed is substantially 15 mm/sec, the predetermined temperature is substantially 300°C, and the AZ31 alloy is used.
  - 10. An article according to Claim 1, wherein the magnesium alloy comprises 2.856% aluminum, 1.022% zinc, 0.329% manganese, 0.004% iron, 0.038% silicon, 0.001% copper, and 0.001% nickel.
    - 11. An article according to Claim 1, wherein the tube is annealed.
    - 12. An article according to Claim 11, wherein the tube is annealed at a temperature of 300°C for six hours.

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- 13. A process for manufacture of a tube from a billet made of a magnesium alloy, the process comprising:
  - (a) heating the billet to a predetermined temperature that is within a range of 300°C to 605°;
  - (b) extruding the billet, using an extrusion press having a ram, an internal piercing mandrel, and a die, while maintaining the temperature of the billet to stay within the range; and
  - (c) applying a force to the billet so that it is forced between the die and the mandrel at a predetermined extrusion speed of the ram to form a tube having a predetermined extrusion reduction ratio;

wherein the extrusion speed is substantially between 5 mm/sec and 45 mm/sec, and the extrusion reduction ratio is substantially between 10:1 and 50:1.

- 14. A process according to Claim 13, wherein the magnesium alloy is selected from the group consisting of AZ31 and ZM21.
- 15 **15.** A process according to Claim 14, wherein the extrusion reduction ratio is substantially 30:1, the extrusion speed is substantially 15 mm/sec, the predetermined temperature is substantially 300°C, and the AZ31 alloy is used.
  - 16. A process according to Claim 1, wherein the magnesium alloy comprises 2.856% aluminum, 1.022% zinc, 0.329% manganese, 0.004% iron, 0.038% silicon, 0.001% copper, and 0.001% nickel.
  - 17. A process according to Claim 1, wherein the process further comprises the step of annealing the tube.
  - 18. A process according to Claim 17, wherein the tube is annealed at a temperature of 300°C for six hours.
- 25 19. A process according to Claim 13, further comprising the steps of
  - (d) cooling the tube at a predetermined first cooling temperature for a predetermined amount of time;
  - (e) sealing the tube from both ends;
  - (f) introducing a pressure medium into the tube;

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- (g) positioning the tube in a mold having a guiding zone at a predetermined guiding temperature and an expansion zone of a predetermined shape at a predetermined expansion temperature;
- (h) applying an axial compression force on the tube so that a section of the tube located in the expansion zone expands to conform to the predetermined shape; and
- (i) cooling the tube at a predetermined second cooling temperature for a predetermined amount of time;

wherein the expansion temperature is within a range of 200°C to 605°.

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- 20. A process according to Claim 19, wherein the expansion temperature is substantially between 200°C and 500°C.
  - 21. A process according to Claim 19, wherein the pressure medium is a gas.
  - 22. A process according to Claim 21, wherein the gas does not react with the metal under the conditions used in the process.
- 15 **23.** A process according to claim 19, wherein the pressure medium is a heat resistant liquid.